

Lymphangiography

Its Practical Value in Surgically Staged Patients with Hodgkin's Disease

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Since the introduction of "staging laparotomy" (to determine the disease's stage) in assessing Hodgkin's disease, some observers have argued that lymphangiography could be safely omitted in the initial diagnostic evaluation.

To test these opinions a series of 75 patients with Hodgkin's disease who had a staging laparotomy and histological correlation with lymphangiograms was reviewed. Of 16 examinations with positive results, one proved to be a false positive. Of the 14 examinations with equivocal results, one proved histologically positive. In the remaining 45 lymphangiograms, five were falsely negative. In all five of these patients abdominal lymph nodes were involved, but in areas that do not routinely opacity on lower extremity lymphangiography. The overall accuracy was 90 percent.

Therapeutically, the lymphangiogram permits accurate planning for treatment by radiation therapy so that all known disease is treated and yet bone marrow is not excessively irradiated. Changes in lymph node architecture after therapy provide valuable information as to regression of the disease or signs of its early recurrence.

WHEN LOWER EXTREMITY LYMPHANGIOGRAPHY was introduced as a routine investigatory device in the early 1960's¹⁻³ it became possible to determine the stage of Hodgkin's disease with greater accuracy. The retroperitoneal nodes could be more routinely and accurately assessed, appropriately treated with radiation, and evaluated at intervals

after the initial therapy. However, after more widespread experience with this diagnostic technique, a number of apparently valid objections were raised as to its value:

- The study may be inaccurate in defining actual involvement in retroperitoneal lymph nodes and does not give any information regarding the porta hepatis nodes, celiac, splenic hilar, or mesenteric nodes.

- The procedure is tedious, time-consuming, expensive, and painful to the patient.

- Ethiodol® emboli almost always occur and

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Submitted, revised, August 14, 1973.

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LYMPHANGIOGRAPHY

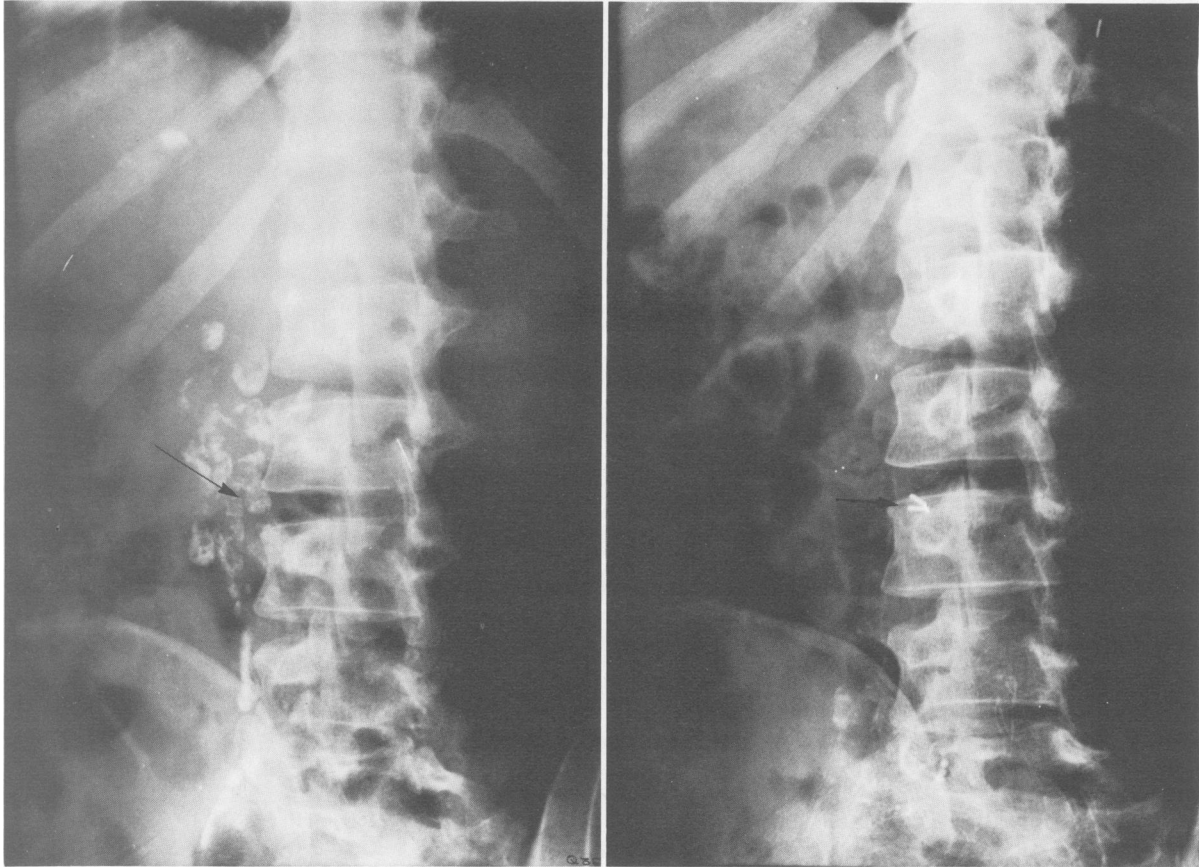


Figure 1.—Left, Preoperative lymphangiogram with arrow indicating several roentgenographically abnormal lymph nodes. Right, postoperative film with surgical clips correlating exactly with the abnormal nodes seen on the preoperative film and histologically shown to be involved with Hodgkin's disease.

TABLE 1.—Staging Laparotomy for Hodgkin's Disease
—Results in Abdominal Lymph Nodes, 75 Patients

	Pre-Operative Lymphangiogram	Histologically Positive	Clinical Staging Error
Positive	16	15	1 of 16 (6%)
Equivocal	14	1
Negative	45	5	5 of 45 (11%)
TOTAL	75	21	6 of 61 (10%)

may cause severe respiratory difficulties in patients with already compromised pulmonary reserve secondary to lymph node disease or underlying respiratory disease.⁴⁻⁷

- Allergic reactions to both the vital blue dye and Ethiodol® have been reported.⁸

Isotopic studies such as gallium-67, indium-113m, and gold-198 have been proposed more recently as a substitute for lymphangiography as a diagnostic tool.

Since 1968, the value of a staging laparotomy as a diagnostic tool in the initial investigation of

Hodgkin's disease has been explored at various centers⁸⁻¹⁴ where histological correlation with the radiographic findings was regularly possible. Early reports from Stanford indicated that lymphangiography was approximately 80 percent accurate in the evaluation of abdominal lymph node disease. Unfortunately, there are a number of physicians involved in treating patients with Hodgkin's disease who have never been convinced of the value of the lymphangiogram and now feel it can be safely omitted¹⁵ from the staging process. The reasons most commonly cited are that lymphangiography is now proven to be unreliable and that the staging laparotomy supersedes the lymphangiogram.

It should be emphasized that the staging laparotomy should still be considered an investigatory tool. It was never intended that it replace the lymphangiogram but rather that it complement it. The objections therefore seem illogical. The purpose of this paper is to clarify and illustrate the role of the lymphangiogram in patients with

LYMPHANGIOGRAPHY

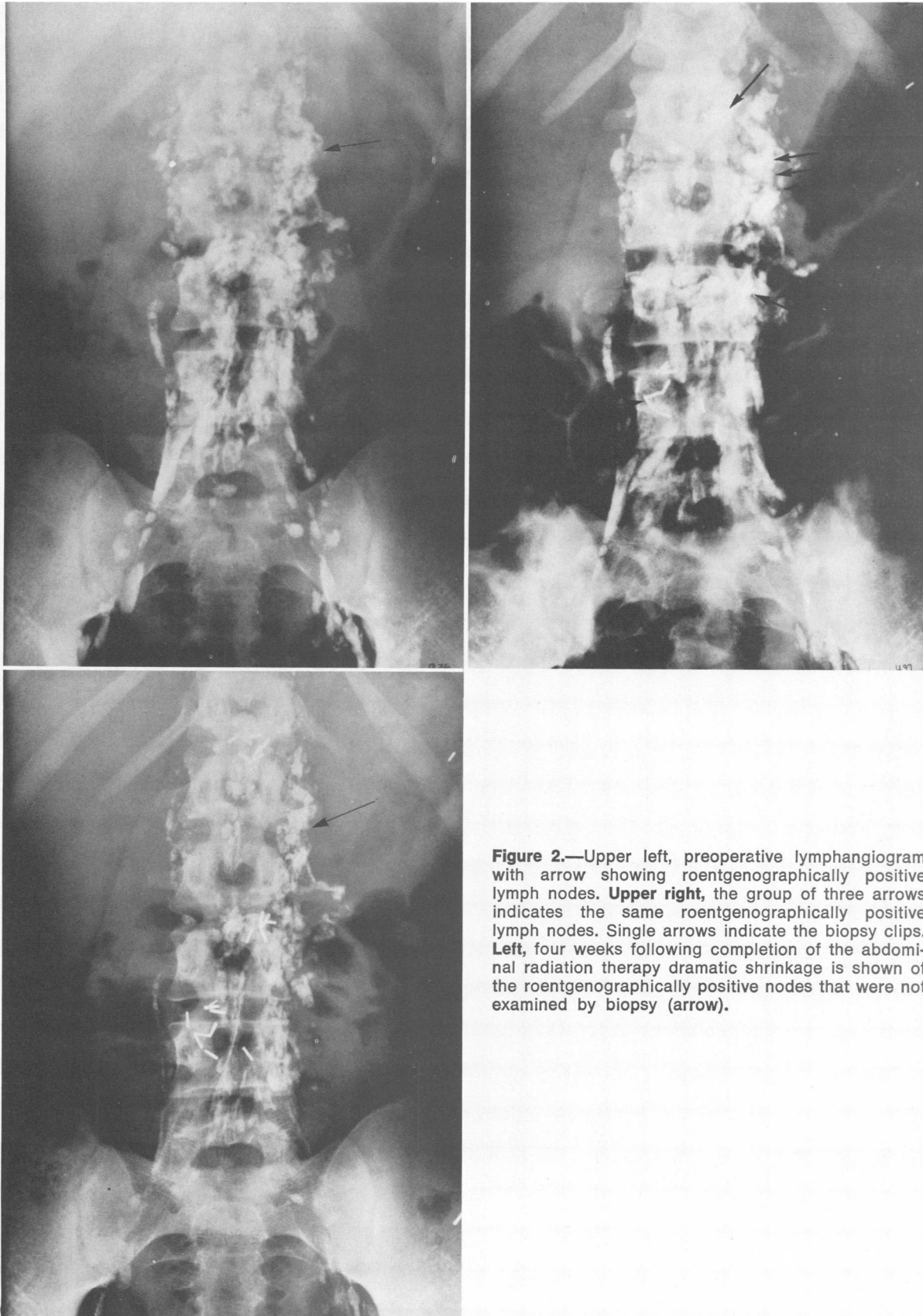


Figure 2.—Upper left, preoperative lymphangiogram with arrow showing roentgenographically positive lymph nodes. **Upper right**, the group of three arrows indicates the same roentgenographically positive lymph nodes. Single arrows indicate the biopsy clips. **Left**, four weeks following completion of the abdominal radiation therapy dramatic shrinkage is shown of the roentgenographically positive nodes that were not examined by biopsy (arrow).

LYMPHANGIOGRAPHY

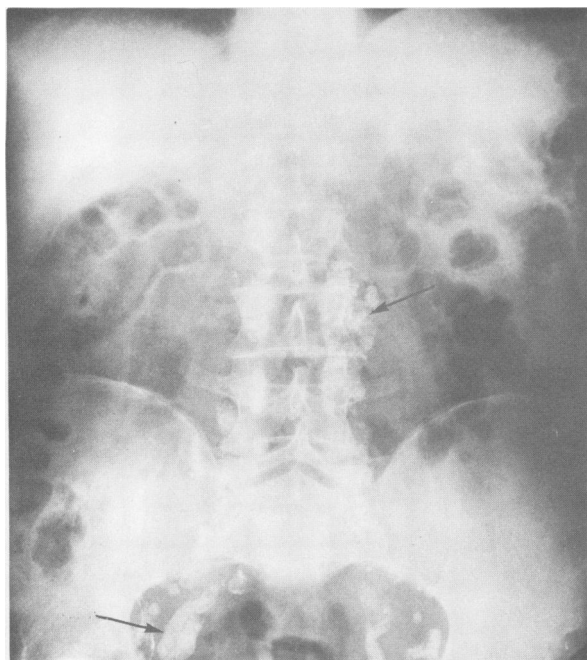


Figure 3.—Arrows indicate large radiographically positive nodes not sampled at the time of the staging laparotomy.

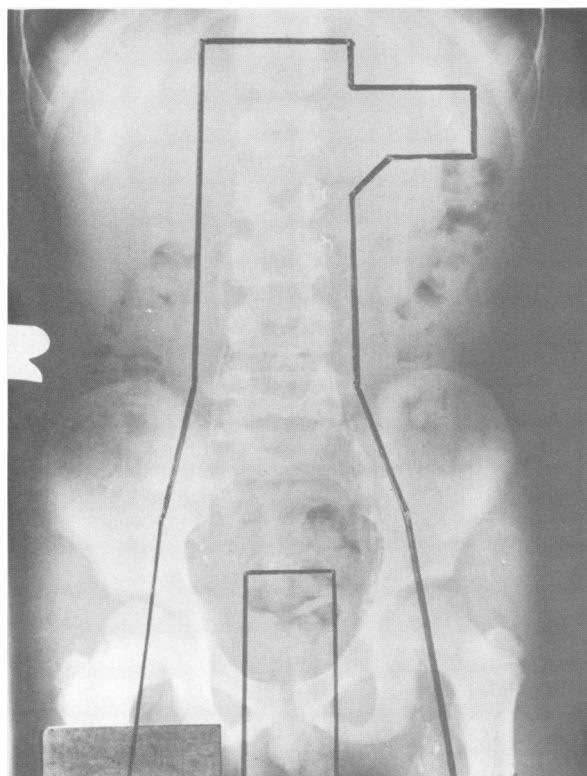


Figure 4.—The regions within the drawing are those which are irradiated when treating the typical lymph node areas below the diaphragm (inverted "Y") following splenectomy. The surgical clips indicate the splenic pedicle and para-aortic lymph node areas where biopsy specimens were taken.

Hodgkin's disease and to answer these objections. In addition, several other important uses of lymphangiography will be discussed and illustrated.

Material

At the UCLA Medical Center since 1969, 75 patients with Hodgkin's disease were seen who had lower extremity lymphangiography and histological correlation with a staging laparotomy (Table 1). In this series, lymphangiography correlated with the histological findings in 15 of 16 patients (94 percent) and this was interpreted as demonstrating evidence of Hodgkin's disease. In the 14 patients where interpretation of results was equivocal, the accuracy was less dependable. Of these patients, the result was histologically positive in one (7 percent). This would seem to indicate that equivocal studies are usually negative.

Diagnostic Value of Lymphangiography

The diagnostic inaccuracies of lymphangiography fall into two categories. The first is that regions such as the porta hepatis and epigastric, mesenteric and splenic hilar nodes do not rou-

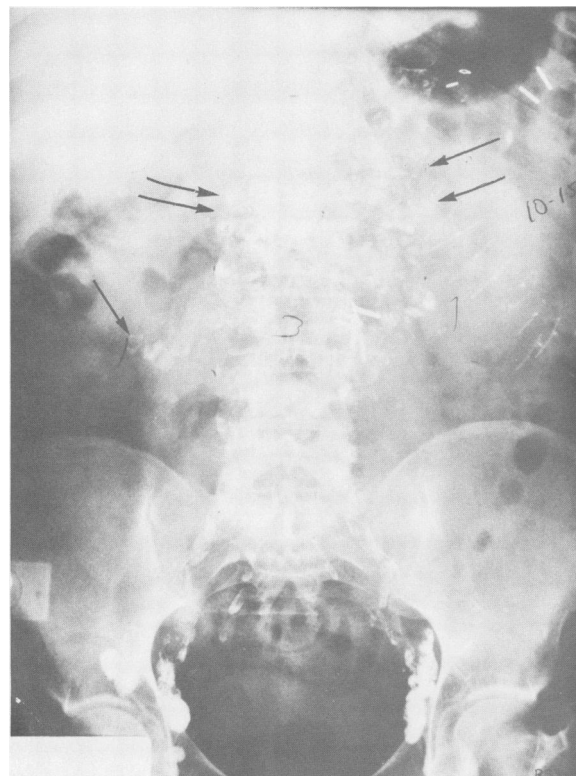


Figure 5.—A restricted "normal" treatment field as in Figure 4 would not encompass obvious lymph node disease as shown in this lymphangiogram. Arrows indicate extreme lateral displacement of these abnormal lymph nodes.

LYMPHANGIOGRAPHY

tinely opacify on lower extremity lymphangiography and therefore cannot be assessed without actual biopsy. This is illustrated (Table 1) by five patients who had a negative lymphangiogram with negative para-aortic lymph node biopsy but had histologically involved lymph nodes elsewhere in the abdomen, splenic hilar lymph nodes in two cases, and in one case each a high abdominal lymph node, a celiac lymph node and a mesenteric lymph node.

The second inaccuracy results when the lymphangiogram is not evaluated before operation. Ideally, the radiologist and the surgeon should discuss the lymphangiogram before operation to delineate the areas that are thought to be involved so that appropriate specimens can be taken for biopsy. This is illustrated in Figure 1. However, when the surgeon takes specimens only from easily accessible para-aortic lymph nodes without consulting the lymphangiogram, a serious diagnostic error may occur. This is illustrated in Figure 2, which shows metallic clips placed in the areas from which specimens were taken. No specimens were excised from the sites that radiographically appeared most abnormal. Although the biopsy of lymph nodes showed no evidence of Hodgkin's disease, it was felt that a sampling error had been made and the patient was treated with radiation to these areas. Subsequently, a dramatic reduction in size of these lymph nodes occurred. To avoid such errors, the lymphangiogram must be seen before surgical operation and discussed in

close collaboration with all members of the specialty team.

Another diagnostic use of the lymphangiogram is illustrated in Figure 3. The patient had had a staging laparotomy for Hodgkin's disease at another hospital. A lymphangiogram had not been made preoperatively. The surgical report stated that there were other clinically involved lymph nodes in the abdomen. Because the nature and the extent of the disease were uncertain, the patient had a lymphangiogram which more clearly defined the total extent of disease. This led to more appropriate therapeutic management. It is not possible to rely on an oral or written report by the surgeon based solely on palpation. The lymphangiogram is essential.

Therapeutic Value of Lymphangiography

Lymphangiography has several definite advantages for the radiation therapist. It is estimated that from 50 to 85 percent of the suspect bone marrow may be irradiated with "total nodal" irradiation.^{16,17} When the exact extent of disease is not accurately known, larger areas of the body often are irradiated to treat all known and potential disease. The lymphangiogram allows the radiation therapist to plan treatment more precisely and irradiate diseased portions without covering an excessive area (Figure 4). The ability of the patient to tolerate extended field irradiation is in part due to the amount of bone marrow not irradiated. The lymphangiogram permits precise

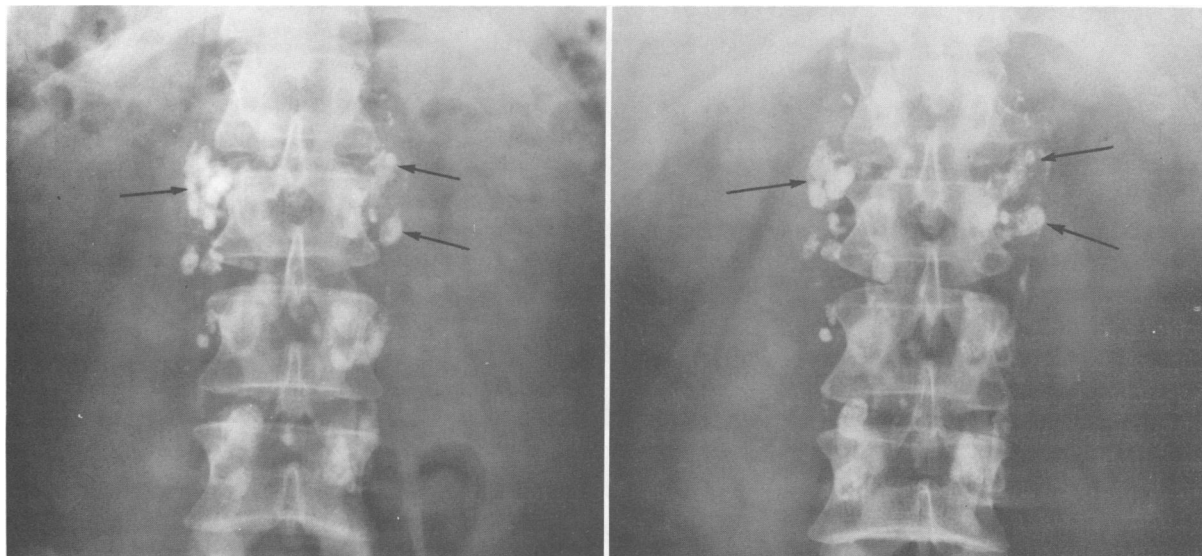


Figure 6.—Left, preoperative lymphangiogram interpreted as normal. No surgical clips were used. Right, the lymph nodes to the left and right of the second lumbar vertebral body have become roentgenographically abnormal by enlargement and displacement. Arrows indicate the nodes which demonstrated the major changes.

and appropriate treatment with definite "bone marrow sparing."

If a patient has extensive abdominal lymph node disease (Figure 5), then treating with "routine" fields of irradiation, as illustrated in Figure 4, would actually miss some of the involved areas. This clearly shows the value of the lymphangiogram in defining the regions to be irradiated.

Follow-up Examination

The Ethiodol® dye usually remains roentgenographically visible in the lymph nodes for periods of from six to eighteen months. By comparison of serial abdominal x-ray films, changes in the lymph node architecture may be seen after radiation therapy. At first abnormal and normal lymph nodes will decrease in size. Subsequent radiographic enlargement of treated lymph nodes may be the first sign of recurrent disease. An example is illustrated in Figure 6. The lymphangiogram was interpreted as roentgenographically normal. This was confirmed by biopsy. Nine months later, a serial x-ray film of the abdomen showed enlargement of several nodes to the left and right of the second lumbar vertebral body. These nodes were proven to be histologically positive.

Repeat lymphangiograms can often be helpful when they are compared with the initial study to evaluate areas that were not involved previously. This is illustrated in Figure 7.

Isotope Studies

New radioisotopic agents are currently being investigated. They also are being used more often in evaluating patients with lymphomatous disease. These radioisotopic agents include gallium-67, indium-113m, and gold-198. Gallium-67 has shown the most promise and has been the agent used most frequently in assessing the anatomic involvement of the disease. A preliminary report by Pinsky¹⁷ has been encouraging. However, experience is too limited at this time to rely exclusively on these agents. They are felt to be an adjuvant to lymphangiography but have not replaced it as a diagnostic procedure.

Conclusions

Some of the objections to performing lymphangiography are valid and the risks involved must be considered. However, the valuable information obtained by such studies outweighs the potential complications. As was clearly shown at the Ann

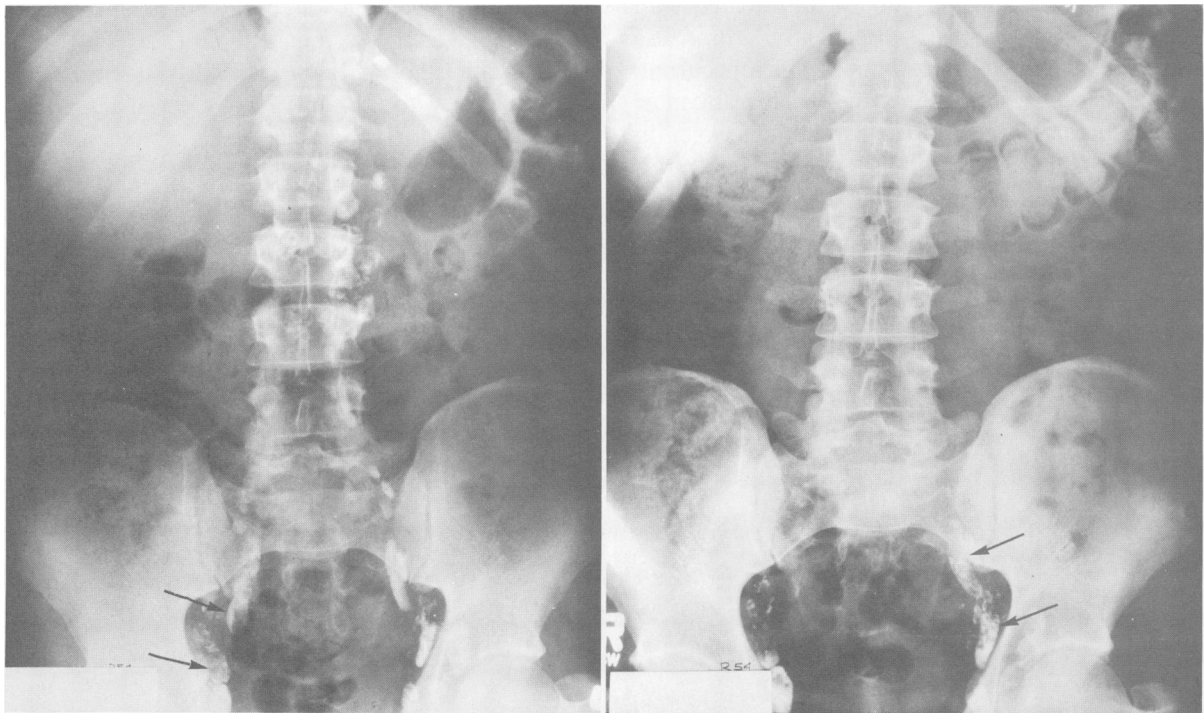


Figure 7.—Left, initial lymphangiogram demonstrated radiographically positive right iliac nodes (arrows). All of the lymph node areas below the diaphragm were irradiated (inverted "Y"). Right, two years later, a repeat study was performed because of symptoms suggesting recurrent disease. Radiographically involved left iliac nodes were now shown and confirmed by biopsy.

LYMPHANGIOGRAPHY

Arbor Conference on Hodgkin's disease, this procedure may not be safely omitted.¹⁹

Lymphangiography is of great diagnostic value in detecting para-aortic, iliofemoral, and inguinal lymph node disease. In addition, lymphangiograms have been of great value to radiation therapists in planning the regions of treatment and in follow-up examinations to assess regression or recurrence.

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Graves' Disease: Unusual Presenting Symptoms; Newer Diagnostic Tests

We [ophthalmologists] should tell other specialists who has Graves' disease, not the other way around. Ophthalmologists as a group should not be asking internists and neurologists and neurosurgeons if this patient with eye signs has Graves' disease. We should be telling them . . . Misleading eye signs are (1) isolated unilateral lid retraction . . . in the absence of the more usual concomitants of exophthalmos, congestion and the giveaway stuff that we're all used to seeing . . . ; (2) unilateral exophthalmos—probably a third if not two-fifths of patients with unilateral exophthalmos have Graves' disease . . . ; (3) apparently isolated myopathies [isolated superior rectus palsy, for example].

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 Extracted from *Audio-Digest Ophthalmology*, Vol 11, No. 3, in the Audio-Digest Foundation's subscription series of tape-recorded programs. For subscription information: 1930 Wilshire Blvd., Suite 700, Los Angeles, CA 90057.